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A Monthly Magazine Devoted to the Interests of Teachers of Geography in Elementary, Secondary, and Normal Schools

RAY HUGHES WHITBECK, Editor
Professor of Geography at the University of Wisconsin

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The JOURNAL of GEOGRAPHY

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WAYS OF RAISING GEOGRAPHY TEACHING ABOVE THE COMMONPLACE*

By ONA I. NOLAN
Emerson School, Boston

WE THINK of geography as "the study of the earth as the *home* of man," and into every new region where we lead the children's thoughts, it is the *life* of the people of that region, which we try to make real.

This same story of human life as it is going on in the world today and the account of man's present activities seem to be what we term "current events."

Therefore the correlation of geography and current events seems to be a matter of keeping geography *up to date*. In trying to keep geography up to date, I have found these ways to be most helpful.

I. BY UTILIZING THE EXPERIENCES OF THE CHILDREN

Actual experiences of some of the children have given a very real flavor to many of our lessons this year. Two boys who lived in England until they were 10 years old; two formerly living in Ireland, and one from Scotland related the most interesting accounts of the people, their ways of living, their schools and school-books, and even of the climate and some of the products and industries of the British Isles.

We found the study of Canada intensely interesting as some of the children formerly lived in Prince Edward Island and Newfoundland and many had travelled or spent vacations in Nova Scotia and New Brunswick. They gave accounts of the fisheries and apple-raising industries that delighted the rest of the children.

France they loved, and so many of them have brothers and relatives there now, that we were deluged with souvenirs and letters containing rather limited accounts of "Somewhere in France." Interesting descriptions of St. Nizarre and Brest and some of the smaller western and southern ports were given us.

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While studying China, one boy read us a letter from his brother, a U. S. marine, telling his impressions of certain Chinese ports he had visited.

One boy, born in Russia, and the presence of a few whose people lived in Russia and Siberia before coming here, gave the class an accurate viewpoint from which to study Russia's natural resources, her limitations, her backwardness in developing, and the possibilities for future development of her vast resources. The relating of these experiences in a simple and natural way made the geography of these countries seem much more real and vital and seemed to bring the *life* of the people of these countries much closer to the children. They seemed to take a keener interest in the people, and to appreciate the part each country played in the world's progress.

II. By Training Powers of Observation

Our children are very familiar with the waterfront of East Boston and to some extent with that of Charlestown, City Proper, and South Boston. Many of our boys work Saturdays and vacations near the wharves and on the boats and can present an amount of first hand information, while the girls report what their fathers and brothers, working near the waterfront, tell them. Instead of class excursions, individuals make reports of their observations of the activities of the waterfront; of the arrival and departure of many of the steamers; of the incoming cargoes and outgoing cargoes of these boats; of the contents of the freight cars in the railroad yards while awaiting shipment on the liners.

These investigations are voluntary on the part of the boys, but as they receive extra credit for every oral contribution of this kind, and as the class makes use of the information contributed at once, if possible, it stimulates all to cultivate their powers of observation. They were quite alive to the coal situation this winter (1917-18) and knew when the boats laden with coal arrived and from whence they came. The recent arrival of a ship from Brazil, laden with a cargo of cocoa and rubber, interested them and gave them a closer feeling toward the port of Bahia.

When a bit of waterfront information is contributed, if it does not concern a country we are studying at that particular time, the class *contrasts* it with the commerce of the country they are studying. They try to decide as to what part of the Middle West the horses in the freight cars come from and where they are going. By arousing and satisfying their curiosity they devel-

op a real interest in everything going on about them, and they try to utilize their information in their geography.

This study of their home geography, I find, they take with them into their foreign geography and they habitually compare everything about the natural resources, limitations, development, industries, and commerce of every country with their own.

While my eighth grade class were studying Great Britain they secured a great amount of information as to the cargoes loaded on the freighters outward bound for England and Scotland. While studying Canada as a colony of Great Britain the arrival of a boat from Nova Scotia laden with potatoes fitted into our study, especially as one of the boys helped unload her and brought us a few samples of her cargo.

The arrival of the United Fruit boats from the ports of the West Indies and Central America, their routes and cargoes, are a source of interest to the children. The Leyland Line freighters, the Cunarders, the Allen Line to Glasgow, the White Star Line to the Mediterranean, etc., were fascinating to our children when those lines were operating their boats upon regular schedules.

From the windows of my schoolroom we often see the boats going in and out of the harbor. Their outgoing cargoes and returning cargoes, their routes, and European terminals, give us every opportunity to teach the commerce, industries, and products of the various countries.

My ninth grade students voted that the most interesting part of our "Study of Boston" this year was what they had observed and learned about Boston from a geographical point of view from their visits to the parks, beaches, shore lines, wharves, and industrial plants. Equally interesting from an historical point of view were their visits to the various public buildings, art museum, library, churches, famous old buildings, monuments, squares, and points of interest connected with Boston's history. These visits have been individual or in groups of two or three, and their pocket notebook habits have enabled them to gather very interesting and accurate data concerning their own city.

The development of the harbor with its islands, channels, lights, and fortifications has interested them most, I think, and has enabled them to appreciate to some extent the possibilities of its future development as most recently proposed by the United States Government. Their habits of observation have awakened their curiosity, started them thinking for themselves, and given them a share in the large human interests of the world's progress and affairs.

III. By Choice of Reading

Perhaps our reading has helped us keep a feeling of being up to date. The use of Brigham & McFarlane, the newest of the text books, has given the children a proud feeling of keeping up with the times, and they enjoy their Adams and Rocheleau text books but delight in supplementing them with the latest verdict on exports and imports, etc., from their new books. A recent issue of the Red Cross Magazine published a diary, written by one of the members of the Red Cross Mission, containing a description of a trip from Vladivostok, through the Chinese cities of Manchuria and across the Siberian Railroad into Petrograd. The children followed the trip day by day from city to city and were really impressed by it.

A little weekly magazine entitled "The World's Chronicle," of which many are regular subscribers, keeps them in touch with some of the most recent events and trade developments of the various countries we study. Many of the children do a great amount of supplementary reading from magazines, library books, books of travel, etc., and we have found the folders and monthly magazines issued by railroads and steamship lines to be very helpful.

In starting each new country the children always want to know how to get there from Boston; how long it takes; how much it costs; and what is the best way to go. A committee appointed to examine the railroad and steamship folders usually helps to settle those questions to their satisfaction.

We have studied a most useful and truly enlightening magazine in regard to the trade developments of Japan. It is entitled "Japan" and is published by a Japanese steamship line. The "South American Magazine" and the "Bulletin of the Pan American Union" are two wonderfully helpful magazines in keeping your viewpoint of South America up to date.

I find that the children carry their personal experiences into their reading and book study, and their imaginations have expanded far beyond East Boston, for we have really lived for weeks in Great Britain and Canada, in France, Russia, China, and Japan, but the passive interest of three usually very enthusiastic classes compelled us to make a short and impersonal trip through Germany. They were greatly interested in Germany's industrial and commercial development, but they loved France, and were fascinated by Japan and her recent and rapid development into a leading world power.

IV. By Use of Newspaper Clippings

More than almost any other method this has helped us to keep geography and current events side by side this year and it has certainly kept us busy. The newspaper clippings come within the reach of all and all have an equal chance.

The second day of school last September, when our regular program started and my geography classes came to my room for their different periods, I started each class on this campaign by giving them a list of all the different countries we were to study during the year. I tried to start them in the habit of watching the daily papers, of reading, and cutting out, and saving every clipping that pertained to any city, river, lake, industry or business of each country and region on their list. Each person was provided with a large manila envelope, in which to keep the clippings until the time came when they could be used. They understood that they would need the Great Britain clippings first, but were to collect all the others and save them until we studied the countries to which they referred. The plan has awakened the children beyond my expectations. At first it was necessary to guide them in their choice of clippings to discard those pertaining only to war activities, and those labelled "London," but containing nothing of interest in geography.

Each child receives credit for every clipping brought in, if he has cut it out carefully, read it through to understand it, and reads it aloud intelligently to the class or gives his own version of it in a few simple words. The pupils listen carefully and give their viewpoint of it and tell what they learned from it. If it contains a picture to illustrate the clipping, it is passed from person to person while the comment is going on. No person receives any credit unless he understands his clipping and can explain it to the class. The clippings, if accepted by teacher or class, are collected at the close of the lesson by a monitor who gives each child credit on a class record sheet. The boys of each class compete with the girls, with the result that at the close of each country studied the honors are usually about evenly divided. The keenest rivalry exists, however, between the three eighth grades, resulting in a close contest between division A and division B.

Th record, kept on the blackboard, of the monthly total of clippings of each division, keeps the pupils alert for every clipping. After the clippings have been read and discussed and credit given by the monitors during a leisure moment, they are transferred to another monitor, who pastes them neatly and arranges them according to countries into a class scrapbook. A very large and very old school record book is used for this pur-

pose. During study periods and spare moments the children enjoy reading these three scrapbooks and mentally comparing them; and a friendly spirit of competition has created a feeling of pride in each class for its book. The ninth grade class has kept an interesting scrapbook of clippings on Boston in a similar way and during study periods in my room the books are in great demand.

Some of the children, who are able to gather a large number of clippings and pictures of the various countries, have made individual scrap books, which the others like to examine. All the recording and crediting and mounting of clippings is done by the monitors or committees, appointed by each class, outside of class time.

The reading and discussion of the clippings sometimes takes about five minutes at the beginning of each lesson and gives a good deal of zest with which to start the lesson; sometimes one period of thirty minutes is devoted entirely to a clipping lesson. This happens once or twice with each country studied.

While studying Japan the pupils were extremely interested in clippings telling of the recent increase in the manufacture of cotton goods since Great Britain has been at war; of the large scale on which shipbuilding is being operated; of the high dividends paid by certain businesses of Japan; of labor conditions in Japan; of the increased manufacture of toys, especially dolls, since Germany has been at war; of the development of Japan's army and navy; of her withdrawing nine steamers of one line from her trade with India and transferring ships of a total of 450,000 tonnage to the United States in exchange for steel.

These and many other clippings were contributed by the children in our study of Japan and were much more up to date than even our new textbooks. I mentioned these to show the type of clipping which they look for and find. Where they find all their interesting clippings, still remains a mystery to me, for every newspaper and magazine has been represented among their contributions. A word of caution given at the outset in regard to cutting any book, has been most carefully observed.

Besides keeping our geography side by side with current events this year, I feel that a much greater good has been derived from this campaign. I feel that it has stimulated the children to an enthusiastic interest in world geography; made them really want to read papers and magazines and keep up to date; helped them to choose wisely what to read; and has formed those habits of alert interest in reading and cutting and saving clippings, and then intelligently using and discussing them, which I hope will remain with them as a personal habit for awhile at least.

V. By Pupil-Teacher Work

By this I mean the conducting of recitations and lessons by pupils; discussion of all topics and questions by pupils; marking of lessons by pupils; asking and answering of questions by pupils; problems encountered, stated, and solved by pupils; informal debates by pupils on big questions raised and chosen by themselves; all comparisons and contrasts of countries as to their natural resources, limitations, development, industrial and commercial activities, etc., conducted by pupils; the presentation and discussion of newspaper clippings by pupils; use of all cards, pictures, graphs, collections and illustrative material by pupils; interpreting of maps and charts by pupils; assignment of home questions, special topic work and committee work by pupils.

As a result we find that the children *think;* that they *think* on all questions; that they *think* for themselves and do absolutely their *own* thinking; and are perfectly independent about expressing their thoughts; and are convinced of their errors—not because somebody disagrees with them—but when somebody in the class proves the result of their thinking or their way of reasoning to be a mistake.

I find that it develops their originality, their initiative, their power to think and think independently, and their ability to apply and use their knowledge of certain geographic principles; and to express their thoughts in geography. But this ability on the part of the pupils to conduct recitations and handle discussions and frame thought-compelling questions for their classmates to answer, does not develop at once but comes as a consequence of a steady growth, resulting from much encouragement and guidance on the part of the teacher, and enthusiastic co-operation on the part of their own classmates.

All pupils have several chances to conduct the recitations, and they are very enthusiastic and anxious to have their chance, for there is nothing prepared about it, as I select a different pupil each day after the class reaches my room.

The presentation of a newspaper clipping or the reading of one paragraph from the textbook starts the pupil-teacher with several questions which he asks the class to answer. They try for big questions; questions of comparison and contrast; and above all questions that will require thought on the part of their classmates to answer. One question leads to another and soon an animated discussion is on. Each lesson is in a way an emergency lesson for their questions open up great fields of thought and their discussions, for instance, of the industrial develop-

ment of Japan, and the reasons for it, and the comparison with Great Britain and the contrast with China all furnish food for thought.

The pupil teacher asks the class questions, they ask him questions, and they ask each other questions, keeping up a lively circle of discussion. They try to settle each question raised, by their own knowledge, or by reference to maps or textbooks, or by vote of the class, or by special topic assignment for the next day, or by a home question assignment for the class for that night; and they take great pride in not having to refer always to the teacher. Each question, as it is raised, is settled in turn, if possible. Sometimes the discussions drift toward history, ancient and modern; sometimes toward questions of economics; sometimes toward science, and it is really difficult sometimes to draw the line between geography and these closely correlated studies. A word of suggestion or guidance from the teacher and the discussion reverts to the original question in geography under discussion until that is settled.

Some big questions, that cannot be arbitrarily settled, they ask to have for a debate and get the expression of opinion of each of the class in that way. All these problems are very real to the children for they encounter them and try to settle them for themselves. Then, too, the problems present themselves for consideration without looking around for them. We sometimes refer to them as problems but more often as questions; but they are vital because they are so worth while to the children that they sometimes ask to have geography during study periods and indoor recesses.

VI. By Use of Maps and Other Materials

If we succeed in training the children to read and understand and interpret maps and charts correctly, we are accomplishing a great deal. A map of the world and a map of the United States hang in front of my classes always for constant reference, together with a political map and a physical map of whatever country we are studying. They constantly use and point to and locate every place mentioned on the large wall maps and small book maps and delight in tracing railroad lines and steamship routes, rivers, currents, belts of rainfall, areas of production, etc.

I find that they "think maps" and " talk maps" in a way all their own. The greatest good from maps, I think, is derived from the maps the children make. They have a system of extra credits for extra maps and the three eighth grades delight to race in making maps: production maps of each country studied, on

which they paste or sew bits of silk, cotton, wool, iron, coal, copper, lumber, etc.; or paste pictures of pottery, china, machinery, ships, etc.; or draw colored grapes, fruit, etc.; in the particular localities in the different countries, where these products are found; maps showing density of population, location of coal fields, rainfall maps, location of railroads and railroad centers, location of fishing ports and shipping ports, world product maps and resource maps, etc.

Of all these different kinds of maps, which they like to make, the production maps have been most popular and show the greatest expenditure of time. Practically all maps have been voluntary work done outside class time.

Pictures, cards, stereographs, folders, magazines, souvenirs, flags, export and import charts, exhibits, and collections of all kinds we use constantly, but I think the maps help most.

Last year my classes received letters from children in Eau Claire, Wisconsin, and we learned more about their winter sports, ice palaces, and ice carnivals than we ever knew before. The children sent back very interesting accounts of Boston, Boston Harbor and its shipping, and the beaches of this part of the Atlantic Ocean.

I have received the heartiest co-operation from the Pan-American Union; U. S. Department of Commerce and Labor; Bureau of Foreign and Domestic Commerce; U. S. Department of Agriculture; U. S. Bureau of Education, and the U. S. Census Bureau and have derived great help from the many magazines, pamphlets, consular reports, charts, graphs, and maps they have sent us.

At the end of a year's work I feel that we have accomplished something if we have developed within our children an enthusiastic interest in geography and have given them large, human interests; if we have excited within them a desire for the information current in books, magazines, newspapers, etc.; if we have taught them to use books intelligently and to read carefully and to judge of the value of what they read; if we have taught them how to consult an index and a table of contents; if we have trained them in habits of reading maps correctly and understanding and interpreting maps by referring to the keys, etc.; if we have made charts, graphs, and statistics mean something to them; if we have developed them so that they know where and how to turn to find almost anything; and have developed within them the power to *think*, and *think* for themselves, and *think* independently—then, I think, geography means something worth while to our children.

CITIES IN SPAIN

By Frederick Homburg
Woodward High School, Cincinnati, Ohio

A Land for Tourists

IT seems strange that of American tourists so few have followed in the foot-steps of Irving, and most have slighted Spain. As Spain's greatness culminated during the great age of discoveries, it is not altogether accident that Spaniards were prominently connected with the discovery and the exploration and colonization of the New World, and that, for a large part of the Western Hemisphere, Spain is the mother country. One circumstance might keep tourists from our country from traveling in Spain: since 1898 an American is not *persona grata* there; but the present world war by its magnitude tends to wipe out the memory of past troubles, to shake out preconceived notions, and possibly to soften the feelings of the Spaniards toward America. Again Spain lies a little aside from the main trade routes; but that in the eyes of a true tourist ought to be regarded as an advantage, inasmuch as you may expect that, aside from the levelling tendencies of a world intercourse, conditions would be more stable and conservative. Just as classicists and archeologists arrange in their interest tours to Italy and to Greece, so those interested in history, geography, ethnology, philology, art, etc., would derive both pleasure and profit from a tour of the Iberian peninsula. For a geographer a land of such striking contrasts as Spain must have particular attractions. There are the arid meseta and the fertile vegas, the continental climate of the plateau, the oceanic climate of the north coast, the Mediterranean clime of the eastern shore, snow-capped mountains and fertile valleys, deserts and oases. And there are the old old cities that reflect the history, culture, and religion of the Spanish people.

Size of Cities

The greatness of Spain is in the past. In size and population, its cities cannot compare with the large cities of many other countries. Madrid, the capital, and Barcelona, the chief commercial and industrial center, are the only towns that have passed the half million mark; and about half a dozen cities range from 100,000 to a quarter of a million. In the time of its glory, Spain could boast of the leading cities of Europe. In the days when London and Paris gave no promise of the magnitude attained at present, Cordova had a population of a million; Toledo

and Salamanca each had 200,000; at present these towns have about one-tenth of the number of inhabitants they could boast of in their prime. Cities with a population of more than 100,000 are Madrid, Barcelona, Valencia, Sevilla, Malaga, Murcia, Cartagena and Saragossa.

At the height of its prosperity the University of Salamanca had an attendance of 8,000 students drawn from all parts of Europe; now there are 500. It follows that in most Spanish towns there is more dwelling space than required by the shrunken population. As new buildings are not needed, the building trade is down, and the old structures are scarcely kept in repair. In many towns whole districts are in ruins. There is an air of the past, of vanished greatness, of antiquity, too, about these towns which often deepens into an impression of decay. The ruins cast a shade of sadness, and the waste places call up memories of better days. The streets are poorly paved, because necessary repairs are neglected; and there is much dirt and poverty. And yet Toledo, in the hands of the Moors, had well paved streets illuminated at night; and this at a time when in the towns of the rest of Europe it was unpleasant and even dangerous to venture into the dark and dirty streets at night, unless accompanied by torch bearers and armed attendants.

Age

The air of antiquity about these towns is peculiarly charming, especially for tourists from recently settled lands. The first Napoleon knew human nature; in his address to his troops in Egypt, he pointed to the Pyramids and called to his men: "Thirty centuries look down upon you." In many a Spanish street we may stand on the scene of the hopes and fears, the joys and sorrows of twenty-five centuries. Saragossa, Cadiz, Tortosa are among the oldest cities of Europe. Saragossa was an important town in Iberian times; Cadiz, Tortosa, Tarragona, Malaga, were Phoenician trading posts; Cartagena and Barcelona are of Carthaginian origin. When the Romans conquered the land, they improved the towns already existing and established new ones; Merida, Valencia, Badajoz, Sevilla were founded by them. The Romans were civilizers and their roads, aqueducts, etc., proclaim their energy and engineering ability.

The barbarians who broke the Roman rule were not town-builders; but the Vandals left a trace of their sojourn in the name of the province of Andalusia which at one time was Vandalitio. In the long contest between the Christians and the Moors, towns were established for strategic reasons; thus Madrid was a for-

tress as early as 930 A. D. Burgos, as its name indicates, was originally a castle, built in the 9th century to check the advance of the Moors. Castile, the chief Christian power in the peninsula before the union of all Spain under one government, derived its name from Castillo, the Spanish term for castle, because of the many castles built to resist Moorish domination.

Language

Castile, like other border powers or marches, advanced to leadership; hence the chief language of the peninsula is *la lengua castillana,* i. e., the Castilian tongue. However, it would hardly be correct to speak in the singular of the language of the Spaniards; for, not reckoning mere dialects, there are not less than four distinct Spanish languages.

What is usually called Spanish, the language of the meseta, of Central and South America, of Cuba and the Philippines, is Castilian, whose sounds are heard in Madrid, Valladolid, Toledo, Sevilla, Granada, Malaga, etc. The last three towns are situated in Andalusia where the dialect is rich in Arabic terms; indeed, in some valleys of the Sierra Nevada are villages where descendants of the Moriscos still speak a sort of Arabic.

In the towns of Galicia and the northwest just north of Portugal, Portuguese is spoken. On the east coast, the Catalonians in Barcelona, Tarragona, Valencia, Alicante, etc., speak Catalan, which is a dialect of the Provencal of southern France.

The most curious language of Spain is that of the Basque Provinces in the northeast; in Bilbao, San Sebastian, and Vittoria is heard what is believed to be a relic of ancient Iberian. Thus we have in Spain one country, one flag and four languages.

Names

In the last century, the original 13 provinces that represented the ancient kingdoms and principalities of which the modern kingdom of Spain was gradually built up, were divided into 47 smaller provinces which usually take the name of the chief town; for example, town and province of Sevogia, Palencia, Cordova, Murcia, etc. This rule with some exceptions is followed in Mexico, Cuba, Porto Rico and other lands where Spanish is spoken.

It would be but natural to expect that in a land like Spain, whose atmosphere has transmitted the sound of so many languages, the names of many places would have been modified by a change of masters. While some names have held their own with remarkable tenacity, there are others so changed as to be

hardly recognizable. It is easy to see that Malaga was derived from Malacca, Valencia from Valentia, Toledo from Toletum, Tarragona from Tarraco; and one can still see some resemblance between Cartagena and Carthago Nova, Cadiz and Gades, Valladolid and Vallis Oletum, Lorca and Elicroca.

A number of towns had at first the word Augusta attached, and that, of course, was an effect of the Roman conquest. Julius Caesar was too busy with other matters to take time completely to subjugate or, to use a Roman euphemism, "pacify" Spain. His successor, Augustus, whose ambition it was to extend the boundary of the Roman Empire to the ocean finished the work of Caesar, and established many military posts and garrisoned a number of towns. To commemorate his success, the title of Augusta was bestowed on many of these places. The name of the ancient Iberian town Salduba on the Ebro was changed to Caesar Augusta; it is now called Saragossa. Bracara Augusta has now become Braga, Asturica Augusta, Astorga. Emerita Augusta, where the emeriti or veterans of Augustus settled, is now Merida; and Pax Augusta in Estramadura, at present celebrated for its hams, is the modern Badajoz.

Sevilla was called Hispalis by the Romans, and Isbilia by the Moors. The Spaniards give this beautiful town the title of "la serena"; it is said, because Andalusian lovers are wont on beautiful evenings to express in song their devotion to their heart-queens, such love songs have come to be called serenades. A number of towns (in Spain and in former colonies of Spain) have the name Santiago; this name is so popular because San Jago, i. e., Saint James is the patron saint of Spain. To have a number of towns of the same name is confusing and inconvenient according to our ideas, because it compels the addition of some distinguishing word, as Santiago de Chili, Santiago de Cuba, Santiago del Estero. The Spaniards, far from regarding this as a drawback, esteem it rather as an advantage because, according to their notions, length of sound adds dignity to a name. The original Santiago is Santiago de Compostella in northwestern Spain; here, it is said, the bones of the celebrated San Jago are interred. An archbishop discovered the site of his burial by being miraculously guided to the field (campus) by a star (stella), hence the name.

Capitals

In a land subjugated at times, and again divided into petty states, many a town enjoys the distinction of having been at some period in the past some sort of capital. When the Carthaginians

controlled all of the then civilized part of Spain, New Carthage, now Cartagena, with its fine harbor, was the center of their power. For ease of administration the Romans divided the country into two provinces: Hispania Tarraconensis, i. e., northern and eastern Spain, and Hispania Baetica, corresponding about to Andalusia of later days; Tarraco, now Tarragona, in the former, Corduba, now Cordova, in the latter were the capitals. Practically the whole peninsula was united under the Visigoths who fixed their capital at Toledo which is the geographic center. Toledo had been a strong fortress under the Romans, it ranked second only to Cordova in Moslem times, and after it had been taken by the Christians, it was for many years the residence of the Castilian kings. Even now it is a capital—the spiritual one—of Spain; for, as the seat of the Spanish primate, it is the center of church affairs. The Arabians and Berbers crossing from Africa easily overthrew the power of the Visigoths and what was to be merely a raid ended in the conquest of all but the northern coast. The Arabians made Cordova the capital of the Western Caliphate. The "Mecca of the West," as Cordova has been called, was the finest and most populous city of Europe of that day; the Cordova of the present is almost lifeless. Many a grand building calls up memories of its towering greatness in Moslem times, above all its imposing cathedral. This great edifice represents four layers of civilization: on this site stood originally a Roman temple dedicated to Jan; the Goths changed the Pagan temple to a Christian church; the Arabian princes reared in its place a magnificent mosque; the Christian conquerors turned this into a beautiful cathedral.

The first blow against Saracenic rule was struck by Pelagio and his followers in the extreme north, in Asturia; the heir to the Spanish throne is still called Prince of Asturia. A number of petty Christian states arose, each with its own center of government: thus Asturia with its capital, Oviedo; Galicia with Santiago de Compostella, the goal of pilgrims; Leon with the steepled Leon and its graves of 37 kings; Navarre with Pamplona, which controls two passes across the Pyrenees. Barcelona, once Barcina, founded by the Carthaginian Hamilcar Barca, now the greatest commercial and industrial center and most modern city of Spain, was at one time capital of the kingdom of Catalonia. Saragossa on the Ebro after being wrested from the Moors was made the capital of the kingdom of Aragon. The capital of Castile in early days was Burgos, but as the kingdom grew toward the south the seat of government was shifted. While the Christian powers grew in strength, their opponents became weakened by

dissensions; as Byron expresses it: "Red gleamed the cross and waned the crescent pale." Another dynasty made Seville capital, and this town, on which the Moors left their impress, was one of their most important posts. Neither the chiefs at Cordova nor those at Seville could enforce obedience in Moslem Spain, and various cities became seats of power of independent emirs. Malaga was for a while capital of an independent Moorish state; so was Alicante, the Lucentum of the Romans, and so others. The last of these to hold out was Granada.

The marriage of Ferdinand and Isabella joined the great Christian states of Aragon and Castile; and all Spain was united when Granada was taken, in the same year that the discovery of America by Columbus added vast territories to the Spanish domain. At the time when in the world empire of Castile the sun never set, Valladolid was the seat of government. Valladolid, the residence of Spanish monarchs, when they were the most powerful potentates on earth, in its campo grande with fifteen churches and its plaza major fringed with arcades, still shows signs of a glory that is past. Here in the royal palace Philipp the Second was born, and here in 1506 Columbus died.

Madrid

In 1560 Philipp transferred the seat of his government to Madrid in New Castle, and Valladolid at once declined. Madrid has ever since been the capital of Spain, its more central position being perhaps the only justification for Philipp's choice. The Spaniards are very proud of Madrid, but tourists find many a Spanish town more interesting. Raised to its high station by the will of an all-powerful king, Madrid is laid out with tiresome regularity. Its climate, that of a dry plateau, is not at all agreeable, for it is marked by extremes of temperature. The Spanish saying, "Nine months winter and three months hell," is an inelegant but forceful statement of Madrid's weather conditions.

Common Characteristics

Houses, especially in the south, are open to the air with inner courts and verandas. This Arabian architecture was carried by the Spaniards to the warm climes in which they settled. We see it in the southern part of our continents and in California. There is more outdoor life in Spain than here; those not bent on business—and time is not such a factor there as here, manana (tomorrow) is the time for anything—congregate on the plazas,

the market places, the space in front of a church, the promenades or alamedas. The alamedas are promenades shaded by trees, not always the poplar as the name would cause one to think, for the Spanish name for poplar is alamo. Many towns have interesting ruins of various civilizations; in the southern towns the Moorish palaces—alcazars—are conspicuous.

One of the most peculiarly Spanish characteristics of the larger towns are the *plazas de toros* or bull-rings. The national hero of Spain was a torero. Charles V appeared several times in the arena, for there was no surer road to popular favor; and at present the expert espadas are more highly esteemed than are the exponents of statesmanship, learning, and art. The bull-fight is a relic of the Roman arena; Julius Caesar has the questionable honor of having introduced it as a novelty. The chief training school for matadores is at Seville.

Monasteries and convents abound but the striking feature of towns is the great number of churches. Remarkable, too, is the number of towns with cathedrals; those of Santiago de Compostella, Leon, Burgos, Toledo, Seville and Cordova are veritable treasures of art. It is strange that at Madrid, the capital, there is no cathedral. Universities are located in the following ten towns, named in the order of the age of these seats of learning: Salamanca, Valladolid, Valencia, Barcelona, Seville, Santiago de Compostella, Madrid, Granada, Saragossa, Oviedo. It is to be noted that all these, excepting Madrid, are also cathedral towns, i. e., the universities are within the shadow of cathedrals, and that epitomizes the spiritual condition of the land. Of all Roman Catholic countries Spain has been the most faithful if not the most servile to Rome. Many centuries of desperate struggle with the infidels made the Spaniards fiercely intolerant. This is the land of the inquisition, where all those of a different faith, —Mohammedans and Jews, Protestants there were none,—had to choose between the church and exile. This exodus of skilled workers was an important factor in the rapid decline of Spanish power.

Special Features

While many traits may be named that are common to a number of towns in Spain, it does not follow that when you have seen one Spanish town you have seen them all. In recently settled countries, towns are usually after the same pattern. Not so in a land with so long a history as that of Spain; it is the diversity of towns that makes a tour of this long settled land so charming.

Some towns have none but historic interest; thus Palos, whence Columbus sailed August 3, 1492, on his first voyage to America, is now an unimportant place. The two great conquistadores came from Estramadura; Cortez was born at Medellin and Pizarro at Truxillo. That warriors should come from Estramadura is not surprising, for as a border province, its people were inured to warfare by the constant struggle with Moors. It is said that Pizarro was originally a swineherd; hog-raising is still an important occupation in this sparsely settled region.

The cities of Andalusia are especially interesting. The strange cross between Carthaginian, Roman, Moorish, and Castilian civilizations, the beautiful monuments commemorating the culmination of Moorish and of Christian power, the strong dash of Moorish blood in the inhabitants, all this adds to the attractiveness of such towns as Seville and Granada.

Seville, on the Guadalquivir, is probably the most beautiful city of the whole kingdom. The alcazar, the campanile, the great cathedral, are admired by those who understand them; but most of the thousands of visitors that annually flock to Seville are attracted not by the works of art, but by the gorgeous processions in connection with the frequent church festivals, and by the bull-fights in one of the largest of arenas.

In the beautiful vega of Granada is enthroned the city of Granada, the last stronghold of the Moors. The pass in the Sierra to the south the Spaniards have poetically, and at the same time truthfully, called Sospira del Moro, the Sigh of the Moor, for through this pass in the year 1492, after the fall of Granada, the Moors retired to Africa; and at this point they took the last fond, lingering look at what had been their beloved home. The alcazar of Granada is the Alhambra, half fortress, half palace, a most beautiful Acropolis, affording an enchanting view of the town and the vega, of the dark foliage of the neighboring hills and the white sky line of the Sierra Nevada.

GEOGRAPHY THE UNIVERSAL BOND

Summarizing a paper devoted to the subject "A Working Basis for the Correlation of Studies" Dr. Chas. DeGarmo said, in the light of these considerations, "I think it may be fairly claimed that Geography is the universal study and that when liberally taught, it forms the bond that binds the ethical, the scientific and the economic courses of instruction into a living whole." [Ed. Rev. 5:466.]

THE REEF-ENCIRCLED ISLANDS OF THE PACIFIC

By W. M. Davis
Cambridge, Mass.

(Continued from September)

The Barrier Reefs of Tahiti and Eimeo

The barrier reefs that encircle most of the mountainous islands in the tropical Pacific are extraordinary structures from every point of view. They add wonderfully to the beauty of the general prospect that one may enjoy after ascending a mountain spur a few hundred feet above sea level; and of all such prospects none can be finer than the one offered from the slopes of Tahiti near Papeete, whence the neighboring island of Eimeo (Murea) may be seen to the northwest across a 15-mile passage of deep blue ocean.

The barrier reef that encloses a narrow lagoon along the north side of Tahiti is marked by a belt of white breakers, between the dark blue of the ocean outside, always rolling in heavy swell under the trade wind, and the brighter tints of blue-green and blue in the shallower and deeper parts of the rippled lagoon. The reef around Eimeo is another white belt, which seems in the distance to lie close along the island shore, for the lagoon there is foreshortened to a mere line.

Darwin's Account of Eimeo

It was this view of Eimeo of which young Darwin wrote in the "Voyage of the Beagle":—"The island . . . . . is completely surrounded by a reef. At this distance a narrow but well defined line of brilliant white was alone visible, where the waves first encountered the wall of coral. The glassy water of the lagoon was included within this line, and out of it the mountains rose abruptly. The effect was very pleasing, and might aptly be compared to a framed engraving, where the frame represented the breakers, the marginal paper the lagoon, and the drawing the island itself . . . . . On the lofty and broken pinnacles, white massive clouds were piled up, which formed an island in the blue sky, as Eimeo did in the blue ocean" (1840, 484, 485). The clouds were there again in 1914; they grow in huge cumulus forms over the island every forenoon in fair weather, and dissolve away as night approaches, giving superb sunset effects when seen from Papeete. If it were generally understood that Tahiti may be reached by a pleasant fair-weather voyage of less

than two weeks in fine steamers sailing from San Francisco on their way to New Zealand, the wonderful sea- and landscapes of the Society islands would be enjoyed by many more Americans than know them now.

Barrier-Reef Flats

The nearer prospect of a barrier reef is not so pleasing as might be imagined, for the reef flat is usually a monotonous stony belt, cluttered over with blocks and scraps of coral rock thrown up from the outer face by storm waves, here and there interrupted by shallow pools, and more or less overspread with sand and slime. At high tide and in stormy weather, the flat is swept over by foaming surges from the ocean; at low tide in fair weather one may wander along the surface, wading at times, and enjoy the strange prospect.

In the Society islands the reef flats that I saw are narrow, except that they are widened near the "passes" or openings, where a deep channel connects the lagoon with the ocean; white or blue herons were occasionally seen there as fellow wanderers on the reef. Some of these reefs are carpeted with a varicolored growth of zoanthus—an organism resembling a small sea-anemone, growing in extensive colonies—which changes its color when contracting and expanding; others are covered with a compact growth of small sea weeds; and still others are bare coral rock pitted with six-inch cavities, in each of which lies a heavy spined sea-urchin.

In Fiji, some of the flats are half a mile or more in width; off the Queensland coast of Australia, where the tides are much stronger than in the mid-Pacific, many of the reef flats are densely occupied with growing corals in great variety, well shown in fine photographic plates in Saville Kent's work on the Great Barrier reef. Other reef flats are crowned with low islands of coral sand, on which a dense vegetation springs up: the barrier of Borabora, a northern member of the Society group, bears an island of this kind several miles in length bearing an extensive coco-palm forest, in the eastern part of its reef circuit.

The Surf on Barrier Reefs

The roll and roar of the surf along the outer border of the reef flat is an almost constant characteristic of barrier reefs. It is curious to note that, from whatever direction the prevailing wind blows, the swell, as it approaches a reef from the heaving sea, arrives upon the shore nearly or perfectly tangent to the curve of the beach, a result of true refraction as the wave passes from deep to shallow water.

It is awe-inspiring to watch the rollers in their ceaseless assault. Even in fair weather the dark blue wave mounts higher and higher, round at first but gradually sharpening its long even crest, then leaning forward in a thinner ridge, up into the hollow front of which the water from nearer shore rises in a long sweeping concave ascent, only to sink again into the next trough as the curling crest passes on; higher and steeper still, threatening to fall, yet sustaining itself beyond expectation, until the edge begins to whiten with foam, from which a counter wind brushes off wreaths of smoke-like mist; then while the water from the forward trough is still sweeping up the concave surf front, the crest arches over and plunges in a grand roaring crash, out of which the spray bursts forward to an even greater height than the surf had reached, while the frothy white surge reverses the outward drift of the shallow shore water and rushes tumultuously up the beach, only to flow down again and meet the next wave a few seconds later. The crest of the surf and the spray that bursts up from its plunging fall rise higher than an ordinary reef flat, and may be seen in the distance while the reef is still below the horizon.

A Hurricane in Fiji

If such be the assault of the surf in fair weather, what must it be at time of storms! Of such I had but one experience, and was then fortunately on a trading steamer in a lagoon cove, well sheltered by the high hills of the central island of Vanua Mbalavu in eastern Fiji. The captain had recognized the signs of an approaching hurricane—falling barometer, darkening clouds and rising wind all day—and had anchored in the sheltered cove until the hurricane should pass by. The gale was from the southeast; it brought rain and grew in strength through the night. The rushing winds came down into our harbor cove from the high ridges of the central island, where it made the coco-palms of a fine plantation wave about frantically and shake off the nut-crop of a year's growth.

I was sharing the captain's cabin on the bridge deck at the time, and when the first-class squalls of this second-class hurricane struck us, they gave me some understanding of the seaman's phrase, "shiver my timbers." We had two anchors out and steam up, ready to set the propeller churning if the anchors dragged, but the bottom was good holding ground. About sunrise the barometer reached its lowest point, almost down to 28 inches; then the "eye of the storm" came over us, with its calm air, an astonishing change from the furious winds of the night.

Following good practice, the captain then steamed around his anchors so as to head northwest, and in about half an hour the wind came roaring upon us from that quarter, this time blowing in full force from the open sea, across the reef and the narrow lagoon. The reef was faintly seen as a belt of foaming waves; it must have been heavily battered with the storm surf and completely overswept with surge. Many blocks of coral rock are broken from the outer slope of the reef at such a time, and all loose detritus—blocks, scraps, sand, and silt—must be either swept over the reef and into the lagoon by the surge, or down the outer slope and into deep water by the undertow. Little wonder that the outer slope of the reef is occupied chiefly by the heavier forms of coral, which can withstand the furious assault of such waves as were then beating upon it.

Even the lagoon, usually so placid, was stirred with angry waves, from which the squalls swept clouds of salt spray along with sheets of rain into our harbor and up the wooded slopes of the enclosing ridges. Naturally enough the usually transparent lagoon waters became turbid with suspended sediment. It must therefore be at time of storms that the finer lagoon sediments are shifted about and smoothly strewn over the lagoon floor.

Surf on the Great Barrier Reef of Australia

The surf on a coral reef has always attracted the attention of explorers; the following account of it was written by Jukes, naturalist on the British surveying ship, "Fly," when he was on the Great Barrier reef of Australia over 70 years ago. "The long ocean swell [coming in from "almost unfathomable depths right up to the outer slope or submarine wall of the reef"] being suddenly impeded by the barrier, lifted itself in one continuous ridge of deep blue water, which, curling over, fell on the edge of the reef in an unbroken cataract of dazzling white foam. Each line of breakers was often one or two miles in length, with not a perceptible gap in its continuity . . . . The unbroken roar of the surf, with its regular pulsation of thunder, as each succeeding swell first fell on the outer edge of the reef, was almost deafening, yet so deep toned as not to interfere with the slightest nearer or sharper sound or oblige us to raise our voices in the least" (Narrative of the Surveying Voyage of H. M. S. Fly, London, 1847, 121, 122).

Corals on the Reef Face

It is rarely the case that the ocean is calm enough to allow easy observation of the shallow outer slope or face of a barrier

reef where the growing corals, mostly of massive, wave-resisting forms, are most abundant. If the observer walks along the reef edge, he may gain glances of coral growths each time that the water recedes from the shore in front of a rising breaker; but the next moment he must stand firm to bear the rush of the foaming surge as it sweeps far up the beach of a reef-island or flows with a depth of half a foot or more over the reef flat into the lagoon. The huge volume of water that thus overflows low and narrow reefs into the lagoon presumably finds its way out again by the passes. The currents thus created must be greatly reenforced at time of storms.

Coral Blocks on Reef Flats

The blocks of coral rock detached from the steep submarine front of the reef and thrown up on the flat are occasionally 10 or 15 feet in diameter. They are gradually shifted toward the lagoon by successive storms, but so slowly that they are pitted and decayed as they go. Curiously enough, these limestone blocks are perforated by many boring worms, which thus aid in the fragmentation of the rock. New blocks are known to make their appearance after storms. The larger ones serve as beacons for native sailors, and we may presume that the changes of their position in stormy weather are reported by oral "notices to mariners" in the harbor villages.

The coral blocks soon become blackened on the surface, probably by some form of alga, and are then often mistaken for blocks of lava, as if they had been derived from the central volcanic island. I found this view of their origin firmly rooted in the belief of several intelligent English residents of Fiji; but when the edge of a block is broken off with a blow from a hammer, the gleaming white limestone of its interior is revealed, often showing coral structure.

If further evidence of the source and composition of the blocks is wanted, let it be noted that at Suva, the capital of Fiji, they are gathered from the reef flat and burnt for lime, and that the supply is never exhausted: a space that is cleared of blocks one year, is more or less cluttered over with them a few years later. The occasional occurrence of lava boulders on reef flats, where they have been used as anchors by native fishermen, or of small floors of lava blocks on reef islands where they have served as hearths, does not count in comparison with the myriads of limestone blocks that are found on most reefs.

Barrier-Reef Lagoons

The lagoons enclosed by barrier reefs are usually placid and clear. It is a wonderful experience to sail in a small boat from island to island, and after pitching and tossing violently in the rolling sea, to enter by a barrier-reef pass into the quiet lagoon waters. But in heavy weather, such as is described in an earlier paragraph, the waters are stirred sufficiently to become turbid with suspended sediment, most of which settles on the lagoon floor when fair weather returns, but some of which is carried out through the passes, and in sufficient quantity to discolor the neighboring sea for a time. It is evidently, as above noted, because of the occasional disturbance of the finer lagoon sediments that the floor of the lagoon is so smooth; and it is as evidently by reason of the abundant supply of sediments that the space between the submarine slope of the central island and the upgrowing barrier reef is filled up to moderate depths.

The lagoon next inside of the reef flat is usually occupied with sloping shoals of white coral sand, evidently derived from the reef; it is on these shoals that the lagoon assumes its beautiful blue-green color in fair weather. The form and the composition of the shoals make it manifest that the lagoon, far from being the product of solution as Murray suggested, is really in process of filling up. The same conclusion is supported by the deposits in the medial belt of the lagoon, where depths of from 20 to 40 fathoms prevail: for the lagoon floor is not covered with the insoluble residue of dissolved limestones, but with accumulating deposits of fine calcareous sand and silt from the outer reef, as well as with a share of fine volcanic detritus from the central island, and with a good proportion of the calcareous framework, more or less disintegrated, of many kinds of small organisms, plant and animal, which grow in the lagoon waters or on the bottom.

Corals in the Lagoon

The loose deposits in the lagoon are for the most part free from living corals, which need a firm basis for their attachment and growth; but the large rock-blocks, which are slowly shifted from the reef flat across the adjoining lagoon shoals by successive storms, are often covered with growing corals. Such growths become luxuriant wherever the shallower bottom of the lagoon is firmly enough consolidated to support them: thus the shallow lagoon enclosed by the barrier reef at Suva, Fiji, is a veritable garden of zoophytes or plant-animals.

It is the coral gardens in the lagoon rather than the enclosing reef flats or the less visible coral growths on the outer slope of the reefs that excite the wonder and admiration of all beholders. The gardens are best seen from a small boat, rowed along so slowly that one has time to examine the endless variety of bottom forms; all the better if the observer is provided with a "water-telescope," or long box with a pane of window glass set in its immersed end, so that the waving reflections from the water surface are cut off; best of all if the boat has a glass bottom and an awning shelter to keep off the light from the sky.

One who is really learned in these matters can not merely describe the appearance of the many kinds of corals, but can tell also their scientific names—those most artificial of all the attributes of natural objects: meandrina, porites, gorgonia, madrepore, goniastrea, fungia, pocillopora, and many others; he can also distinguish between the plant-like but truly animal zoophytes, and the animal-like, but truly vegetable phytozoons; but except to the few equally learned readers in many thousands, these names are hardly more than labels behind which the natural objects are hidden, however serviceable the labels are as verbal handles with which the specialists who know them well may pick the natural object up for further examination.

Fortunately for me, to whom nearly all the names are Greek from whatever language they are derived, they would be out of place in the present article, and it must therefore suffice merely to describe the corals themselves in popular terms. Some of them are two or three feet high, repeatedly divided and subdivided in many branches like thick-stemmed, spiney bushes, rather than in few divisions like antlers or stag-horns from which the bushy corals take their common name. Others spread in broad fronds or sprays, lacelike in delicacy at their margin. These higher forms grow in copses and thickets, divided by rambling lanes and paths of white sand. Others still are globe-like, with the surface divided in meandering patterns like the convolutions of the human brain; but the greater number are low and sessile, like cushions of coarse-textured moss, or spike-nail curry combs, or the under-surface blades of a mushroom, or a handful of short thumbs—all sorts of incongruous terrestrial objects must be drawn upon to provide likenesses for the plantations of this strange marine landscape gardening.

The colors are varied and delicate, seldom bright and never glaring; bluish, pinkish, yellowish, brownish, all the more beautiful from being seen thru the crystalline transparency of the lagoon waters, which seems to add a soft brilliancy to the coral

tints, just as sea water makes pebbles so much brighter when they are wet on their native beach than when they are dry on shore.

The lagoon gardens include various forms of lime-secreting plants, as above intimated, which are sometimes so abundant as to make the name, coral reef, a misnomer. Seaweeds are not abundant. Among other associates of the lagoon corals are sea-urchins with long black spines like knitting needles, large dark-blue starfish, slowly crawling reddish-brown sea-cucumbers, and many kinds of fish of varied hues; of these the most beautiful are little creatures, about two inches in length and of a metallic blue color, which swim about at ease among the coral branches, paying no heed to the boat that floats over them.

Mollusks are abundant in great variety; it is an endless pleasure to collect their shells on a coral beach. The most remarkable are the gigantic clams, one or two feet in length, which live embedded in the reef flat, hinge-line down; the indented valves, lined with a varicolored mantle, agape at the surface, and of so strong a grip that none but the unwary risk an entrace into the mysterious cavity below.

Crabs are plentiful, especially the clown-like little hermits, which clamber about and clatter their borrowed shells on the shore rocks; also the larger burrowing crabs, low comedians which infest the delta-flats, making amusing gestures with their stalked eyes, and playing queer antics as they sidle away to their holes.

Wallace's Account of Lagoon Corals

No wonder that the great natural aquarium of a coral-reef lagoon excited the enthusiasm of an exploring zoologist like Wallace, who during his journey in the Malayan Archipelago many years ago wrote: "For once the reality exceeded the most glowing accounts I had ever read of the wonders of a coral sea . . . . . The clearness of the water [at Amboyna] afforded me one of the most astonishing and beautiful sights I have ever beheld. The bottom was absolutely hidden by a continuous series of corals, sponges, actiniae, and other marine productions, of magnificent dimensions, varied forms and brilliant colors."

Fringing Reefs

Fringing reefs are formed in the clear water around the spur-end points of the central island within a barrier-reef lagoon, but they avoid the bayheads where the water is muddy after heavy rains, and where the sediment would choke and smother the coral polyps. Reefs of this kind thus situated are fronted with growing corals to a moderate depth, probably seldom more

than 10 fathoms in narrow lagoons, below which the relatively weak waves of the lagoon cannot remove detritus.

Fringing reefs also occur on open coasts, and there resemble barrier reefs in having their exposed slope swept by strong waves; hence the growing corals of such fringes probably extend to a greater depth than on fringes in barrier-reef lagoons. The sea-facing fringing reefs on embayed coasts differ from barrier reefs in suggesting, as noted above, that the subsidence which embayed the coast and determined the level at which the reef should be formed took place more rapidly than the rate of reef-upgrowth; while barrier reefs suggest that the subsidence which caused the diminishing central island to shrink away from its upgrowing reef was not faster than the rate of reef upgrowth.

Fringing Reefs Indicate Subsidence

Both kinds of fringing reefs usually afford evidence of submergence that has been even more generally overlooked than that provided by the embayment of coast lines: for in every case of which I have learned, the spur ends of embayed coasts around which fringing reefs grow—either in barrier-reef lagoons or facing the open sea—give indication of continuing beneath sea level the form that they visibly possess above sea level: and as their visible form above sea level clearly results from the prolonged work of ordinary erosional forces, by which the initial volcanic cone has been reduced to a dissected and denuded remnant of its original mass, their similar form below sea level must have been similarly produced; and in order now to lie below sea level and to be fringed with a reef, the island must have been submerged since it was dissected and denuded.

This kind of contact between a fringing reef and the submarine prolongation of an eroded spur is described by the geological term, unconformable, and although the meaning of unconformities has been known to geologists for more than a century, the evidence given by unconformable fringing reefs in favor of the submergence of the island upon which they rest has been almost universally overlooked.

Ocean Rise or Island Subsidence

The question may, however, be properly raised as to whether the submergence of reef foundations, testified to by embayed shore lines and unconformable contacts, cannot have been produced as well by a rise of the ocean around a still-standing island, as by a subsidence of the island in a still-standing ocean. Considered in the abstract, one possibility is as good as the other, just as the diurnal rotation of the vast sphere of the sky around a

fixed earth gives in the abstract just as good an explanation of the phenomena of sunrise and sunset as the rotation of the little earth within the fixed sphere of the vast sky.

In the latter case, the decision that the earth turns and the sky does not is made on good grounds of mechanical economy. Similarly in the former case, terrestrial economy suggests that it is inadvisable to account for the submergence of a few islands by a rise of ocean level, for such a rise must be universal and must be accompanied by a rise of the shore line on all other islands, and on all continental coasts unless they also rise at the same time and by the same amount. No such universal submergence everywhere of the same amount is observed. Hence the simplest and most economical way of accounting for the unlike submergences of various islands is by unlike local subsidences of the islands themselves. Even if several islands of a group have suffered a similar submergence, it is not warranted to appeal to a universal rise of ocean level as a cause therefor, unless signs of an equivalent submergence are found in many parts of the earth.

Changes of Ocean Level in the Glacial Period

Nevertheless, there is good reason for thinking that during the Glacial period of sub-recent geological time, when great continental ice sheets were successively formed and melted, the level of the ocean must have been correspondingly lowered and raised by a significant amount, perhaps as much as 20 or 30 fathoms. Some of the submergence that is indicated by embayed shore lines and unconformable reef contacts should therefore be ascribed to the rise of ocean level that accompanied the last disappearance of the continental ice sheets.

On the other hand when a group of islands, like the Fiji archipelago, is closely studied, it is found to have recently suffered so many submergences and emergences, measuring from 50 to 100 fathoms or more and differing in amount and date in different parts of the archipelago, that local subsidences and uplifts must still be appealed to as the chief causes of changes of level; the subsidences giving opportunity for reef upgrowth, and the uplifts revealing the previously formed reefs as limestone terraces around their supporting islands.

Atolls

The most remarkable as well as the most numerous coral reefs are those which, known as atolls, stand alone in the open ocean, enclosing a shallow lagoon. They are inscrutable objects, for with the exception of Funafuti, mentioned below, their

submarine structure is unknown, and they have no central island which suggests subsidence by its embayed shore line and its unconformable fringing reefs. Atolls may nevertheless be regarded as having been formed just as barrier reefs are formed, the only difference between the two being that the subsidence which has diminished the height and area of a central island in a barrier-reef lagoon, has gone on far enough to submerge the island completely in an atoll lagoon.

The reasons for this belief are: First, barrier reefs and atoll reefs differ in no essential respect. Second, a series of examples can be arranged, beginning with an island belted by a fringing reef, continuing through a number of barrier reefs in which the central island occupies a smaller and smaller part of the enclosed lagoon area, and ending with atolls. Third, atolls occur in Fiji, the Society Islands, and other archipelagoes in close association with barrier reefs, which are with good reason believed to have grown up during the subsidence of their foundations. Fourth, a few elevated atolls are known, in which traces of an unconformably underlying volcanic foundation are laid bare. Fifth, a boring over 1100 feet in depth was made nearly 20 years ago in Funafuti atoll in the Ellice group of the equatorial Pacific, and the best discussion of the results thus gained indicates that that atoll was formed by upgrowth during subsidence.

Population of Atolls

Atolls are among the least useful of islands. They are so low that earthquake waves may sweep over them; they have limestone in abundance, but no other rocks; their soil is so scanty that their vegetable products are of small variety; the native human population finds little opportunity for development in such an environment. Pearl fishing is said to be a profitable occupation in some atoll lagoons; but the gathering of mother-of-pearl shells, which are shipt to Japan to be made into buttons, is a larger reef industry.

So active has been the exploration of the Pacific during the past hundred years that all its atolls appear to have been discovered and charted, but by far the larger number of them are still serious dangers to navigation, for they are without lighthouses. Yet in the wide expanse of the Pacific ocean, certain atolls are helpful as half-way stations for submarine cables, and as foundations for the towers of wireless telegraphy. A few atolls that have been moderately elevated contain valuable phosphate deposits, which have been actively exploited for use as fertilizers and otherwise.

(Concluded in November)

THE UNITED STATES HAS BECOME THE GREATEST OF SHIP-BUILDING NATIONS

ON July 4th, 94 vessels, aggregating 466,386 tons deadweight capacity, were launched. About three-fifths of this tonnage was steel and two-fifths wooden construction. No such impressive launching of ships ever before took place. It exceeds our total launchings of the year 1901, the record pre-war year in American ship building, and is not far below the total British output for 1916.

The Pacific Coast launched the greatest number of ships of any of the sections of the country. Even the Great Lakes yards are building ocean-going vessels of moderate size. Ships drawing 14 feet of water can pass from the Great Lakes to the sea by way of the Welland Canal and the St. Lawrence.

The building of new ships is now going on increasingly in excess of sinkings: the corner has been turned. The United States has sprung, in a single year, to the foremost place among ship-building nations. The Delaware has passed the Clyde as the world's first ship-building river. Almost unbelievable records are being made in the speed of construction. Ships are being launched 4 weeks after the keels are laid and are delivered ready for use in from 2 to 3 months. Not only has their cynical boast that submarines would bring the Allies to terms in a few months, returned to mock the Germans, but the submarine menace has given a spur to ship construction in America which promises to reduce Germany to an inferior place as a maritime power after the war. We shall pay a large price in dollars for the ascendancy as a ship-builder which we are gaining, but the results promise to be worth the cost.

THE WORLD'S OUTPUT OF TIN, 1916 AND 1917

By Dr. Adolph Knoff
U. S. Geological Survey

THE world's output of tin in 1916 was 135,400 short tons, the bulk of which came from the Malay Peninsula and the adjacent islands of the Dutch East Indies. The Federated Malay States is the largest single producer, leading with 49,000 tons, and is followed by Bolivia, with 24,000 tons. Fifty-three per cent of the world's tin was produced within the British Empire in 1916.

The United States imports almost the whole of its supply of tin, as it does not produce more than 150 tons annually, mainly from Alaska. It is the largest consumer of tin in the world and its consumption is steadily growing; in 1916 the United States consumed 55 per cent of the world's output; and in 1917 it consumed 57 per cent. Great Britain is the next largest consumer of tin and, before the war, was closely followed by Germany.

The world's tin is obtained chiefly from placers, mainly in the Malay Peninsula, the Dutch East Indies, China, and Nigeria. The large output from Bolivia, however, is obtained from lodes, as is also that of Cornwall, South Africa, and part of that of Australia.

One of the main changes in the tin industry since the beginning of the war is that part of the Bolivian ore is now brought to this country to be smelted at the plant of the American Smelting and Refining Company, at Perth Amboy, N. J. This smelter is now producing tin at the rate of 14,000 short tons a year. A smelter has also been built by the Williams Harvey Corporation at Jamaica Bay, Brooklyn, N. Y., and is expected to begin operations in September, 1918. This plant also will smelt Bolivian ore. Formerly a large part of the Bolivian ore went to Germany to be smelted near Hamburg. Another significant change in the world tin industry is that the large output of the Dutch East Indies, which formerly went to Holland, now is shipped directly to this country.

WORLD'S OUTPUT OF TIN IN 1916 AND 1917, IN SHORT TONS.

	1916	1917
Federated Malay States	49,130	44,600
British Protected Malay States	4,900	5,000
Bolivia	23,510	29,300
Banca	14,000	14,000
Billiton and Singkep	5,500	5,500
China	8,410	9,000
Siam	9,400	9,400
Nigeria	5,680	6,000
Australia	5,980	6,000
Cornwall	5,260	4,600
Union of South Africa	2,100	2,000
Other countries	1,500	2,000
	135,370	137,400

JAPAN—THE LAND OF SILK

By A. Y. Cowen
Bureau of Research, War Trade Board, Washington, D. C.

SILK garments are more in evidence in this country today than ever before, and this is true of the other countries where the war's ravages have as yet not had their telling effects, and where prevailing prosperity and abnormally high earnings have encouraged the buying of erstwhile luxurious silk underwear, skirts, waists, shirts, etc. Because of its inherent beauty, luster, and smoothness, silk appeals to the general instinct of women and to an extent also of men.

As the United States does not produce one pound of raw silk, and consumes more than the rest of the world, we are, of course, large importers, chiefly from Japan, the world's leading silk country, producer of approximately sixty per cent of the world's total supply. Silk today is linked up with the name of Japan—the England of the East.

The Foremost Industry of Japan

The raising of mulberry trees, the rearing of cocoons, the reeling of silk, and the manufacture of silk fabrics form the most important industry in Japan both in point of numbers engaged and income derived. The industry extends throughout the Empire although centered principally in five prefectures. About one-third of the agricultural families of Japan are engaged in sericulture, producing an annual cocoon crop estimated at $180,000,000, or eighteen per cent of the agricultural income of the country. Besides, there are in the industry 248,000 reelers with an annual output of more than 34,000,000 pounds of raw silk, and silk fabrics are manufactured to a value of $75,000,000. Habutae, constituting the main item among the silk fabrics, has been a Japanese specialty for centuries. Japan is also the world's largest exporter of silk, the value of which equals roughly thirty per cent of the total shipments from the Empire.

Growth of the Industry

The silk industry in Japan originated with the foundation of the empire and has made remarkable progress since then. The government early realized its importance and extended assistance in various ways. At one time silk fabrics were accepted in the payment of taxes. In 1911 the Sericultural Institute was established by the government with six experimental stations and charged with working toward the improvement of the mulberry

tree, silk worm breeding and silk reeling. The government also grants a bounty to encourage mulberry tree planting. Moreover the government gratuitously makes examination of the raw silk produced and, to maintain high standards, demands inspection of fabrics intended for exportation.

Japan Peculiarly Suited to the Industry

Japan is peculiarly adapted to engage in sericulture. Climatic conditions are favorable for the cultivation of mulberry trees, the leaves of which serve as food for the silk worms. Labor is cheap. Numerous attempts to introduce silk growing in the United States have failed because of lack of cheap labor. Whole families, including the old and young, devote a part of their time to sericulture in Japan, although the net proceeds are but a few dollars a year. However, as silk-worm raising is carried on by the farmer's family chiefly as a subsidiary occupation and the income derived ofttimes equals and even surpasses that afforded from other sources, the money earned is highly prized. Manual labor is largely employed, although machinery is being installed to an increasing degree.

Great Care Employed

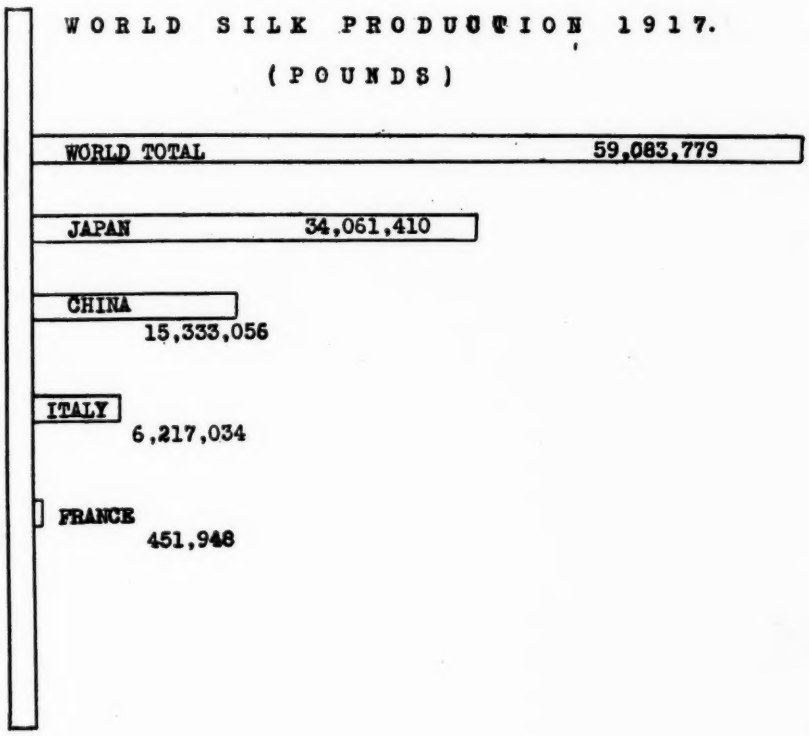
The work, while light, requires painstaking attention throughout the various stages. The eggs laid by the moth are attended to with lavish care and needed warmth and shelter are provided them. The same treatment is accorded the silk worms after they are born. They are weighed, and tender mulberry leaves are chopped to proper size and spread over them to eat. The attention expended on these worms is not unlike that bestowed upon a newly born babe by its mother. Delicate handling is required, and women and girls are therefore mainly employed. Having attained full development, the silk worm spins a silken envelope of a continuous strand or thread known as cocoon, and itself becomes transformed into a chrysalis inside this cocoon. In a few weeks the chrysalis changes into a moth, pierces the cocoon at one end and emerges. To preserve a continuous and unfractured thread, which will permit of unwinding and reeling, it is therefore necessary to kill the chrysalis before it seeks to pierce the cocoon, and this is effected by heating. Of course a number of moths are saved for future breeding and egg laying.

Reeling the Silk

The cocoons are now immersed in boiling water preparatory to reeling; the outer layers are brushed away to reach the con-

tinuous strand and as a single filament is too fine, a number of strands are joined together adhering because of the natural gum, and thus they are reeled and made into skeins. It is in the form of skeins that raw silk is imported into this country.

The reelable silk in a single cocoon varies from 300 to 700 yards, and it takes over 2,500 silk worms to produce a pound of raw silk.



Manufacturing

Before the raw silk can be used as warp or weft in weaving it must pass through another stage known as "throwing," whereby the silk, adhering so far only because of its guminess which must eventually be removed, is turned into yarn by twisting and doubling processes. Deft hands and crafty machinery now weave the beautifully designed and brocaded fabrics we all admire so much.

The initial effect of the war was in the direction of diminished production of silk in Japan and other countries, such as Italy and France. Unlike that of the latter two countries, however, Japan's setback proved but temporary. Japan has forged ahead during the war, increasing her output over 40% in the years 1912 to 1917, and compensating for the unrecovered losses in silk output elsewhere. The manufacture of silk fabrics has also made progress during the war years. Today Japan retains an unchallenged position with the exception of the manufacture of silk fabrics wherein the United States easily exceeds all countries in production.

"GEOGRAPHY OF WHEAT PRICES," A REVIEW

By N. A. Bengtson
University of Nebraska, Lincoln

"WHERE, in the United States, do farmers receive the highest prices per bushel for the wheat they raise? Where are the average prices the lowest?" These questions have been asked classes of college students by the writer for the past three years and have been answered accurately by less than five per cent. of the membership,—and that in a section of the country where the wheat industry is of almost paramount importance. The general ignorance of the situation as regards this vital product renders most interesting a recent publication by the United States Department of Agriculture, Bulletin 594, entitled "Geography of Wheat Prices" by L. B. Zapoleon (1918). In this publication the fundamental principles controlling the differences in prices paid for wheat to farmers in the various sections of the United States are fully discussed.

The price of wheat is dominated by the demand for it as a food for man rather than as a feed for animals. In the case of corn and also oats the reverse is true. Although the production of corn and oats is the greater by far, wheat enters directly into the channels of industry and commerce more largely than either of the other cereals. The farmers' consumption of wheat is less than the consumption of corn and oats by the farmers' stock,—hogs, horses, and cattle. Therefore the movement of wheat is heavy from the surplus regions toward those of deficient production and toward export centers.

The author presents a striking fact when he says, "In the price graduations of wheat the basic consideration appears in that, whereas wheat is destined for human consumption, wheat growing has been steadily relegated to the less densely populated

regions." The student of industrial history recalls that in this country three so-called wheat granaries have passed through their zenith careers and have been relegated to comparatively insignificant positions, viz. the upper Chesapeake Bay region, the Lake Plains of northwestern New York, the East Central States. In these places wheat is still a highly important crop, but supremacy had to be yielded to the broader, more expansive plains of the territory beyond the Mississippi. Now the great wheat belt is in the vicinity of the ninety-seventh meridian, extending from southern Kansas to the Canadian line. Farther westward is a vast potential wheat land, notably in Montana, as yet but slightly developed but making rapid progress; so the westward march of wheat empire still continues. Wheat is a crop especially well adapted to extensive farming.

The North Atlantic States grow only about one-fifth of their wheat requirements. Taking the entire group of Atlantic States with the Southern section, Maine to Texas, twenty-five states in all, we have fifty-six per cent of the total farm lands in the United States producing only sixteen per cent of the national wheat crop. The East-Central States produce about sufficient wheat for their own requirements. The territory west of the Mississippi produces about sixty-nine per cent of the nation's wheat crop, though it includes but thirty-eight per cent of the farm lands and but twenty per cent of the population. This grouping of the states into surplus and deficient regions naturally gives the first and foremost cause of price differences,—farm prices of wheat are lower in regions of surplus production than where production is deficient.

The various sections vary greatly not only in quantity of wheat needed but also in form, whether milled or in grain, and in relation to export trade. Thus, New England, almost entirely dependent on wheat from the West, is supplied in the form of flour. The section requires about 33 million bushels for consumption, and in addition serves as an export highway for nearly 30 million bushels more.

The Middle Atlantic States constitute the greatest export gateway in the United States, and one of the greatest in the world. This section produces less than one-fourth of its requirements for food and seed. Its flour mills grind about twice the quantity produced. Shipments to this group of states supply a deficit of 117 million bushels for home consumption and are augmented by about 165 million bushels, grain or flour, for export. This moves almost entirely from the ports of New York and Philadelphia. Thus it is seen that this section draws for consumption

and export fully one-half of the surplus production of the wheat region.

In the South Atlantic States the requirements are double the production, and Virginia and Maryland are the only important wheat producers. But little of the wheat passes out of the country where raised, thus indicating its use for seed and for grinding in small local mills. Baltimore and Newport News are important export centers but to the south no other Atlantic coast cities are of importance in this respect.

It is readily seen therefore that the eastward-moving wheat is concentrated in a great stream through the northern gateways, —Boston, New York, Philadelphia, and Baltimore. As localities lie within this belt they are within easy access of the current, hence easily supplied; as they lie remote from this belt, they are supplied at greater expense. This readily accounts for the fact that higher farm prices for wheat prevail in South Carolina than in New York. Although the discussion probably intentionally avoids mention of physiographic barriers, it seems that the author of the bulletin could well have called attention to the fact that this mighty stream of wheat empties into the Atlantic at the ports named because between them and the western plains the Appalachian barrier is less effective than farther south. The gaps of the Hudson, Delaware, Susquehanna, and Potomac, coupled with the tidewater estuaries, constitute after all the fundamental control.

In similar manner the movement to the south through Galveston may be traced and the movement westward through Seattle, Portland, and San Francisco. In each case it is worthy of note that in regions of deficient production farm prices are higher as distances from main export centers and highways increase.

In regions of surplus production the opposite is true. As distances from principal export centers and highways become greater the price of wheat to the farmer becomes less. Thus central Montana and eastern Idaho (surplus producing regions) are more remotely situated than are the Dakotas or eastern Washington, and, as a consequence, farmers are paid less for their wheat because the cost of the haul is greater. Likewise the farmers of eastern Colorado and Wyoming being situated farther from export centers than their cousins in Nebraska and Kansas, receive less per bushel for their wheat.

Ratios of cost of production, price of land, and stabilities of prices are well treated. Needless to add here, the profit of wheat production is not lowest where farm price is at a minimum. With soil and climate favorable, land prices are closely related

to stage of development and to accessibility of markets. The pioneer in an undeveloped region is handicapped by difficulty of access to market. As development of transportation proceeds, this handicap is overcome and a profitable economic situation becomes a reality instead of a hope. With this development the price of land increases. The pioneer becomes a gainer in proportion to the amount and rapidity of the rising land values. The West has been fortunate in this respect, for its prairies were easily broken up and made productive. The railways in most cases brought the pioneer and made markets accessible to him. Thus, reward has come in the first generation instead of being delayed until the third or fourth, as was the case in the forested East,—a land much more difficult to open up for grain production.

Thus, the factors controlling production, those controlling prices, and the relations of these to profits are interdependent. Their study presents a fruitful field to teachers and students of geography.

GEOGRAPHY IN BRITISH UNIVERSITIES

By G. G. Chisholm
University of Edinburgh

AN indication of the gradually rising status of the subject in British Universities is to be found in the fact that within the last twelve months two lectureships in the subject have been raised to the rank of professorships. In the summer of 1917 the lectureship on geography in the University of Liverpool was made into a professorship, and Mr. P. M. Roxby, the first lecturer, was appointed as the first holder of the chair. In the other case geography is associated with anthropology in the new chair which has been founded at University College, Aberystwith, and Dr. H. J. Fleure, author of "Human Geography in Western Europe," the substance of a portion of which appeared in a recent issue of the Geographic Review, has been appointed professor. The president of the Royal Geographical Society (London) in his anniversary address delivered in May looks forward to a great impetus to geographical study of the higher class being given by the example of the Universities of Oxford and Cambridge, if they decree, as is now proposed in both Universities, that geography shall be included in the subjects for a degree in honours. At Edinburgh University a degree of Bachelor of Commerce has just been established and in the studies for this degree geography is made obligatory at one stage, and is among the optional subjects at a more advanced stage.

PROFESSOR DAVIS'S "HANDBOOK OF NORTHERN FRANCE"*

PROF. W. M. DAVIS has prepared a little book of 175 pages, in which he interprets in a masterly way the most significant features of the topography of the battle zone of France. Of this handbook, Colonel Azan, chief of the French Military Mission says: "If I were asked to draw up a list of the things that an American soldier, embarking for France, ought to carry with him, I should put at the head of it this little book."

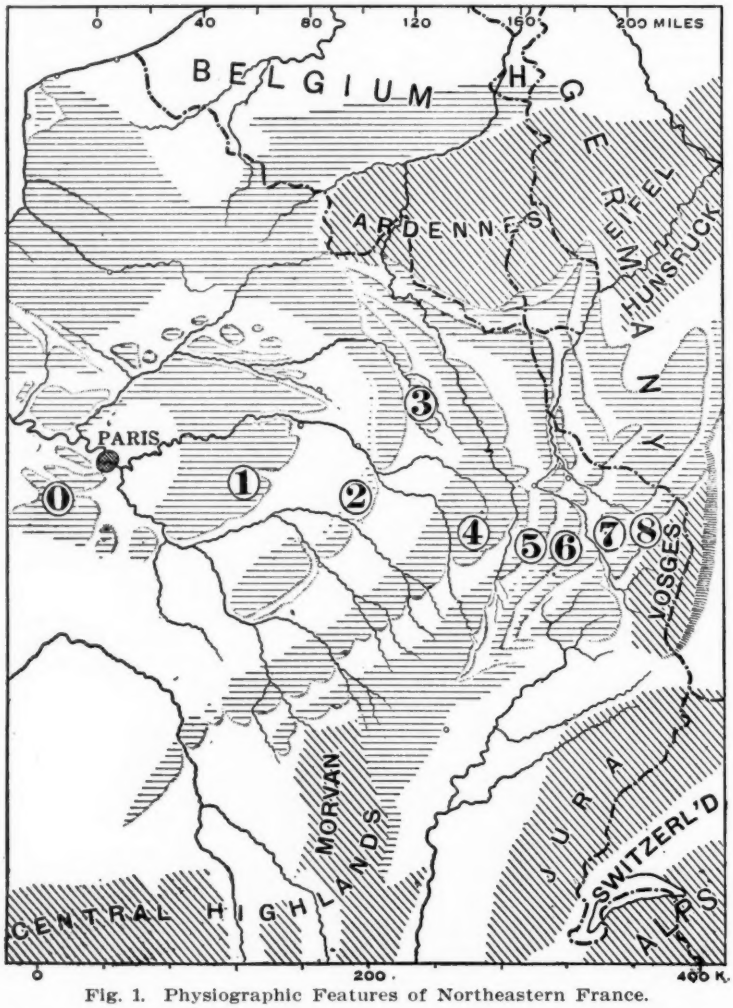


Fig. 1. Physiographic Features of Northeastern France.

Of all the topographical features of northeastern France, none plays a larger part than the series of eight roughly-concentric escarpments lying between Paris and the German frontier This region Professor Davis thus describes:

*Harvard University Press, Cambridge, 1918. $1.00.

"THE BELTED RELIEF OF NORTHEASTERN FRANCE. The concentric belts in which the stratified formations outcrop in the eastern half of the Paris basin from the Central Highlands on the south to the Ardennes on the north, and the correspondingly concentric arrangement of uplands (shaded and numbered from 1 to 8 in Fig. 1) and lower lands (unshaded) following the outcrops of stronger and weaker strata, like aureoles around the Paris center, are the leading physiographic features of northeastern France. There are indeed no better illustrations of this kind of topography in the known world. As the variety of features is large, their description cannot be short.

"Each belt of weak strata is worn down, as in Fig. 2, in an unsymmetrical depression, limited on the east by the long and gentle ascent of the next underlying resistant strata, and on the west by the steep scarp of the next overlying resistant strata. Conversely, each belt of resistant strata remains in relief as an

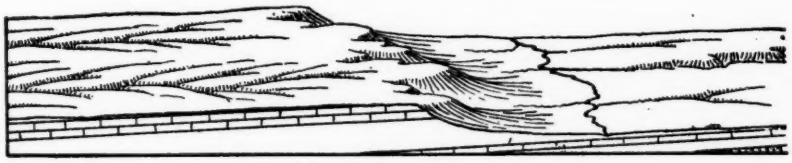


Fig. 2.

unsymmetrical upland ridge, having a broad crest with a steep escarpment or scarp descending eastward to the depression excavated on the next underlying weak strata, and a long gradual slope descending westward to the depression excavated on the next overlying weak strata. Hence the "grain" of the relief in this half of the Paris basin follows a series of upland belts arranged in concentric arcs, convex eastward, as above noted.

"The eight upland belts are by no means alike. The first is of strong relief; the second is lower and of more delicate form; the third is the shortest of the series; the fourth and fifth are long and strong; the sixth is less distinct; the seventh is the least developed of all, and is characterized more by its limestone soils than by an unsymmetrical ridge form; the eighth is strong along the western border of the Vosges, but elsewhere is marked chiefly by its infertile sandy soils. The intermediate depressions also vary in dimensions and in form; it should be understood that, although unshaded in Fig. 1, they are not always lowlands of small altitude above sea level, nor are they always plains; some of them have a rolling or hilly surface 100 m. or more in altitude; but they are always lower than the adjoining upland belts."

The figures here shown are reproduced by the courtesy of the author of the book. There are 45 maps and drawings and every one tells its story.

PROBLEMS IN THE MILITARY GEOGRAPHY OF EUROPE

1. The desire on the part of both Germany and Russia to keep the other from gaining control of the Dardanelles—Bosporus region was one cause leading up to the present war. Why was this region so important to the ambitions of both countries?

2. The invasion of Belgium by Germany was promptly followed by a declaration of war on the part of Great Britain. Is it likely that a similar invasion of Denmark or Switzerland would have brought a declaration of war so promptly by Great Britain? Why or why not?

3. Germany might be expected to invade France across the boundary where the two countries actually meet. Show how geographical considerations opposed this plan and favored the plan of attacking through Belgium.

4. Why does Great Britain so jealously guard the Suez Canal? What connection do you see between the British advance into Palestine and this effort to make the Canal safe?

5. What geographical reasons do you see which have impelled Great Britain to prosecute the campaign in Mesopotamia?

6. What geographical reasons made Bulgaria a more essential ally than Rumania to Germany?

7. Can you see any geographical reason why Norway leans toward the Allies and Sweden toward the Central Powers?

8. Though Spain has had at times during the war a strong leaning toward Germany, she has not dared to join Germany in the war. How has geography influenced Spain in this matter?

9. Greece found it very difficult to decide whether to cast in her lot with the Allies or with the Central Powers. Can you see any geographical reason for this?

10. Switzerland lies between two of the Allied countries on one side and the two Central Powers on the other, yet has been free from invasion. How has geography influenced this?

NOTES

Cape Cod Canal Plans

FOLLOWING the issue of the presidential proclamation taking over the Cape Cod Canal, the Railroad Administration, which has been charged with its operation, issued a statement reading in part as follows:

The operation of the canal will make possible the water transportation to New England consumers of a much larger tonnage of coal hereafter than would have been possible under the previous status.

While the present depth of 19 feet at mean low water will permit the movement of a large tonnage of coal and other freight, the prompt dredging of the canal under government auspices to its original charter depth of 25 feet will permit the safe and quick movement of all the vessels now engaged in carrying coal to New England with the exception of 10 or 12 whose draft exceeds 25 feet, and it is estimated that out of the 12,000,000 tons of waterborne coal now moving annually to New England ports of destination north of Cape Cod a maximum of 10,000,000 tons can be moved through the canal after two months' dredging of the sand accumulated at the entrances of the canals and Sagamore Bridge. [Weekly Export Bulletin.]

Our Ten Billion Dollar War Trade Balance

Our "trade balance" during the first four years of the war—excess of exports over imports—is, in round terms, ten billion dollars, or as much as all of our favorable trade balances in the entire 33 years preceding the war. Normally, in the years prior to the war, our exports exceeded our imports by about 400 million dollars a year. Occasionally the excess was over 500 millions, and on four occasions, 1898, 1901, 1908 and 1913, crossed the 600 million dollar line, the largest trade balance on record prior to the war having been that of 1908, $666,431,554. With the beginning of the war, however, the excess of exports over imports showed a remarkable increase. This was quite natural since Europe, from which we had drawn so largely in certain lines of materials, was no longer in position to spare any considerable quantity of merchandise, but, on the other hand, needed great quantities of materials of the classes which we could readily supply, namely, food and war materials. As a consequence, in the very first year of the war, the fiscal year 1915, our excess of exports over imports was $1,094,000,000; in 1916, $2,136,000,000; in 1917, $3,631,000,000, and for the fiscal year 1918, which ended with the month of June, is reported by the Department of Commerce at $2,982,000,000, this figure being subject to slight changes in final revision of returns. [The Americas, July.]

Our Future Machinery for Building Up Commerce

A bill is before Congress, fathered by the New Orleans Chamber of Commerce and approved in general principle by commercial organizations of other ports all over the country, backed also by the Tariff Commission, which will authorize the construction of "free ports" in or adjacent to any United States sea-port. A "free port" is simply an inclosure in a harbor of a country that has a tariff system, into which ships may come and go, unload or transfer cargoes, etc., without necessity of customs

supervision. The first idea has been to have these "free ports" as general international markets, where trans-shipment and re-export business may be freely carried on. Re-export markets give the manufacturers in a country having them an advantage in prices. They also help along the shipping and the general merchandising organization to have these collateral activities of international commerce going on. In the greatest modern development of international commerce, however, the "free ports" are used as the means of constructing the finest mechanical devices for helping to make trans-oceanic shipping just as cheap as possible. By having a safely inclosed area, with custom-house entrances and exits on the land side at which the tariff business may be transacted when goods move across the "tariff line" it is easy to handle goods and machinery in big units without the careful supervision of customs officials that necessarily impedes and makes costly the movement of loading and unloading at ordinary piers. So much of the finest harbor machinery is seen in free ports, we may confidently look forward to the matching of our ship lines with the mechanical terminals so necessary to effective transportation. [THE AMERICAS, July.]

GERMAN MEGALOMANIA.

A CYNIC once declared that "the Americans are a people who know the price of everything and the value of nothing." The British have been contemptuously referred to as "a nation of shopkeepers." Germany was popularly supposed to be the sentimental nation "par excellence," the land of the blonde Gretchen, of the Christmas carol and the fairy tale, the country of "plain living and high thinking."

But nations reveal themselves under the stress of trial. The British and the Americans, "the nations of hucksters," have shown that they can live—and die—for an ideal, while the nation supposed to be ruled by sentiment and idealism has proved to be animated solely by the grossest materialism. Gone the Germany of Goethe, of Schiller and of Heine; gone the Germany of Luther, of Beethoven, of the "Volkslied" and the fairy tale. Luther's grand hymn, "Ein feste Burg ist unser Gott," with which the legions which fought for the independence of the fatherland went into battle, has been replaced by the "Hymn of Hate" and the arrogant "Deutschland, Deutschland ueber alles," with which the army of the kaiser set out to conquer the world. The God of their simple forefather has been replaced by "unser gute, Alte deutsche Gott," a revival of Wotan or Thor of the Scandinavian mythology, whose will, the kaiser declares, he is called to impose on a recalcitrant world. [Editorial, *Washington Post*, August 4, 1918.]

WHYS ON THE ATMOSPHERE AND CLIMATE

1. Why is the atmosphere more dense at sea level than at high altitudes?
2. Why does warmed air tend to rise?
3. Why does dew form on cool summer nights?
4. Why does it form more abundantly on some objects than on others?
5. Why does dew not form on cloudy or windy nights?
6. Why do clouds form?
7. Why do they form at considerable altitudes?
8. Why do clouds sometimes seem to melt away or dissolve?
9. Why are most clouds white? Why are some very dark? Why are the sunset clouds often brilliantly colored?
10. Why is a cloudy night in autumn usually warmer than a clear night?
11. Why is the sky sometimes free from clouds?
12. Why do we not expect rain from a clear sky?
13. Is there any basis for the proverb—"Rain before 7, clear before 11?" Explain.
14. Why does moisture collect on the ice pitcher? Why not on a pitcher of warm water?
15. Why does our breath show on a cold day and not on a warm one?
16. Why does water "boil away"?
17. Why do clothes dry rapidly on some days and slowly on others?
18. Why is it difficult satisfactorily to press a garment in certain kind of weather? What kind of weather?
19. Why may even a sheet of paper over a flower bed save it from frost?
20. Why does fanning cool us?
21. Why is *mercury* used in a barometer?
22. Why is mercury used in a thermometer?
23. Why does the mercury in the barometer rise and fall?
24. Why does the mercury in a thermometer rise and fall?
25. Why does the mercury in a barometer stand higher at sea level than on a mountain?
26. Why is the barometer used in determining altitudes?
27. Why is the air near the earth's surface usually warmer during the day time than that higher up?
28. Why is a stream of cool air sometimes found flowing down the stairways of our houses in winter?
29. Why does a chimney "draw"?
30. Why does wind hasten evaporation?

AMERICA IN ARMS

OTTO KAHN TELLS OF IMPRESSIONS IN EUROPE

I CANNOT find words to express the depth and intensity of my admiration for the spirit, the morale and the achievements of the American army. It is difficult to speak of our boys and their leaders without using language which may sound rhapsodical, and which yet is no more than the bald and sober truth. I have met a great many officers and men on the boat going over to Europe, at our army bases, along the lines of communication and at the front.

Everywhere I found the same simple and unostentatious, yet grim and iron determination to hold life cheap for the honor and glory and safety of America; everywhere the same modest, sympathetic and soldierly bearing, and keen and quick-witted adaptability; everywhere the same role of splendid and eager courage, of willing discipline and service, of uncomplaining endurance under hardships and discomforts, of buoyant good nature and humor, of clean and kindly thought and feeling. . . . . .

In addition to the magnificent record our army has already made as a fighting force, and the promise, amply warranted, of further great achievement, the capacity which our West Pointers in command of the great army bases have demonstrated for far-sighted, broad-visioned, boldly-conceived planning, for constructive work and for efficient business organization is nothing short of marvelous.

I am pretty familiar with big organization work, but I have seen nothing which impressed me more, and very few things, indeed, which impressed me as much as the work planned, executed and administered at the French harbors, at our bases and along our line of supplies by that great chief, General Pershing, and the officers whom he has placed in direct charge. Nor have I met any wiser or better posted or more hard-working men than those at the head of special departments of the army with whom I had occasion to come into contact.

An immense debt of gratitude and recognition is due from the nation to its defenders. They have won golden opinions wherever they have been in Europe, they have been a revelation to other nations, they have shed lustre upon the name of America.

No American can come in touch with the affectionate admiration, with the trust and faith of the Allied nations towards our country without feeling even more profoundly and reverently than before the high privilege of being an American citizen, and without being stirred by a solemn sense of the obligation to do whatever he individually may be capable of doing, to prove himself a worthy servant of the Great Republic in war as well as in peace, and an earnest and sincere helper, however, modestly and humbly, towards the realization of her high ideals and lofty mission.